Illinois Department of
Natural Resources
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Pat Quinn, Governor
Marc Miller, Director

April 9, 2010

Mr. Michael Harsted, Director
LaSalle County Dept. of Environmental
Services and Land Use
119 W. Madison, Room 406
Ottawa, IL 61350

RE: Invenergy LLC Grand Ridge Phase V Wind Farm, LaSalle County
Endangered Species Consultation Program
EcoCAT Database Reviews #1002887, 1002888, 1002889, 1002891, 1002892

Dear Mr. Harsted:

This letter provides the Endangered Species Consultation for the Phase V Expansion of the Grand Ridge Wind Farm located in LaSalle County. The project was submitted for consultation in accordance with the *Illinois Endangered Species Protection Act* (IESPA) [520 ILCS 10/11], the *Illinois Natural Areas Preservation Act* (INAPA) [525 ILCS 30/17], and Title 17 *Illinois Administrative Code* Part 1075.

The following protected resources could be adversely impacted by the construction and operation of the wind energy facility. To minimize or avoid potential adverse impacts, the Department recommends the measures described below be implemented by Invenergy Grand Ridge and incorporated in LaSalle County's project authorization.

Indiana Bat, *Myotis sodalis*

This expansion of the Grand Ridge WRA will potentially bring turbines to within 12 miles of the Blackball Mine, east of LaSalle; the only federally-designated Critical Habitat for the federally-listed Indiana Bat in Illinois.

This species disperses widely from its hibernaculae, with documented movements up to 300 miles. The Department possesses only one capture record for the Indiana Bat outside of the Mine in LaSalle County (where Pecumsaugan Creek passes beneath Route 6, just upstream of the mine entrance), suggesting that most Indiana Bats using this site migrate to summer locations outside LaSalle County. Surrounding counties also lack records, suggesting that bats wintering here migrate significant distances to summer colony locations.

The proximity of the Grand Ridge WRA to the Blackball Mine Critical Habitat suggests the Grand Ridge WRA will contain higher numbers of the Indiana Bat as they disperse and concentrate during migration. An Indiana Bat was killed in 2009 by collision with a wind turbine at a large wind farm in Benton County, Indiana, the first to be documented.

Invenergy LLC has been conducting bat use and mortality studies following construction of the earlier Grand Ridge phases. Based on preliminary findings for one year, collision and baro-trauma mortalities of more common bats have been on a par with those reported elsewhere in Illinois, and no dead or injured Indiana Bats have been identified.

Recommendation #1. Continue bat use and mortality studies and analyze acoustic recordings of bat calls to identify use of the area by Indiana Bats. Conduct mist-net surveys of nearby riparian areas to determine whether summer colonies exist in the vicinity. Because of the risk of collision or baro-trauma mortality, Incidental Take Authorization *for Indiana Bat should be requested in accordance with 17 Ill Adm. Code Part 1080. Communications concerning the ITA application should be directed to Joe Kath, Office of Resource Conservation, One Natural Resources Way, Springfield, IL 62702. Phone: 217-785-8764; e-mail: Joe.Kath@illinois.gov.*

LaSalle Lake State Fish & Wildlife Area/INAI Site

LaSalle Lake SFWA, a 2,000-acre IDNR management unit located in the northern half of Brookfield Township and nominally within the project footprint, is designated as part of the Illinois Natural Areas Inventory (INAI) because of its extremely high value as an over-wintering habitat for migratory birds.

At the commencement of Phase I wind facility development, the Department was concerned that birds wintering at LaSalle Lake would come into dangerous proximity to the turbines when departing from and arriving at foraging areas during low-ceiling or poor-visibility conditions, increasing the risk of collision mortality. The Department was also concerned about the potential negative effect the presence of wind turbines might have in excluding waterfowl from nearby foraging habitat, thus reducing available winter food resources, or requiring much higher energy expenditures to reach food resources beyond the wind turbines.

The results of Invenergy's monitoring of waterfowl use of areas developed in Phase I of the Grand Ridge Project are encouraging. Its studies have established that, despite a very high rate of exposure to wind turbine blades (flight near wind turbines at altitudes within the rotor diameter), only one dead mallard has been found and there is little or no evidence birds are avoiding this airspace. This result is consistent with findings at other Midwestern wind farms, and this level of mortality is sustainable.

Results pertaining to exclusion from food resources have been less definitive, however. The study reported birds "feeding in fields with turbines," but did not measure or estimate the distances from turbines where feeding occurred. This approach does not exclude the possibility significant food resources are no longer available. (For example, if no foraging occurs within 118 feet of a turbine, food resources in one acre are effectively lost, though the remainder of the field is still available.) Further studies are needed to ascertain whether and to what degree such

exclusion occurs, and to explore variables, such as whether similar effects are present when a turbine does not operate. It may be that such exclusion, if present, becomes important only in years with high bird populations or scarcer food resources.

At the same time, there is little or no evidence that fewer birds are present at LaSalle Lake during the winter as a result of the presence of nearby wind turbines. Many regional, even global, factors determine the numbers of birds present in any given year; therefore many years of observation will be needed to determine whether the presence of wind turbines diminishes the habitat value of LaSalle Lake.

Recommendation #2. Invenergy should design and implement studies to determine the displacement and exclusion effects, if any, exerted by turbines on foraging waterfowl to establish the extent of food resources which may be denied to birds wintering at or near LaSalle Lake INAI Site.

Otter Creek INAI Site

Several thousand acres of the project area drain to headwaters of Otter Creek and its tributary, Wolf Creek. No part of the designated INAI portion of the stream system is located within the Grand Ridge Wind Resource Area (WRA). This high-quality stream system supports an unusually-diverse assemblage of mussels and may occasionally be ascended by the endangered **Greater Redhorse**, *Moxostoma valenciennesi.* Numerous records exist for this species in the Vermilion River near Streator. The Greater Redhorse ascends smaller tributaries to spawn, and juveniles frequently spend most of their time in waters less than six inches in depth for the first year or two of their lives. Consequently, smaller tributaries of larger rivers serve as important "nursery" areas for this species. The Greater feeds mainly on stream-bed detritus and invertebrates, preferring clean gravelly or cobbled substrates where such prey is abundant. While no records for this species have been established for Otter Creek, the extent of scientific sampling is unclear. Erosion related to turbine construction and maintenance may degrade stream-bed habitats or suppress prey populations.

The threatened **River Redhorse**, *Moxostoma carinatum* is also documented in the Vermilion. It is unlikely, however, that this species ascends into the WRA.

Many of the tributary streams have been channelized and retain little riparian woody vegetation. However, drain tiles help keep summer water temperatures low, a condition crucial for maintenance of diverse mussel populations downstream, and for the recently-listed **Mudpuppy Salamander**.

Underground power line crossings of Otter Creek tributaries should be avoided if possible. Where they are necessary, directional borings are the preferred installation method, if soils are sufficiently strong to contain the boring lubricant.

At a power line crossing, the electro-magnetic field (EMF) associated with these lines will span the water column and may have a field strength on the order of 42 milli-Gauss, around four times as much as an overhead power line. Although this is far below human health-effect thresholds

(833 milli-Gauss), it may still have the potential to alter the movements and distribution of aquatic fauna in the streams. Little is known about biological behavioral responses to EMF in field contexts (cellular responses have been documented in laboratories).

While some aquatic species, like the Mudpuppy, are well-known to possess electroreceptor sensory cells, the number of species which may also rely to some degree on such senses is poorly known. Thus it is difficult to evaluate the potential effects of EMF on many organisms. EMF may create barriers to migratory movements of aquatic species which have a sensory dependence on electrical fields. Studies performed where the EMF extends throughout the water column will improve understanding of such phenomena. (No electric field--a different parameter--should exist in association with an underground power line.)

Recommendation #3. Damaged or destroyed field tiles should be repaired promptly to minimize downstream disruptions of the thermal regime of the Otter Creek INAI Site.

Recommendation #4. Best management practices, including adequate engineering of long-term structures such as service roads, should be employed to minimize or avoid any increases in siltation or sedimentation downstream of the project area in the Otter Creek INAI Site.

Recommendation #5. Prior to any in-stream disturbance of the Otter Creek INAI Site resulting from construction, improvement, or repair of roads, bridges, culverts, or power lines, the affected stream segment should be surveyed for threatened or endangered aquatic fauna, such as the ***Greater Redhorse*** *or Greater Redhorse juveniles and the* ***Mudpuppy Salamander****, and pre-existing habitat should be promptly restored afterwards.*

Recommendation #6. Collection power lines should cross streams, if necessary, via directional boring. Studies should be performed to detect changes in the distribution and behavior of stream fauna in the Otter Creek INAI site which may be associated with the presence of electro-magnetic fields (EMF) emanating from power lines crossing beneath streams.

Listed Migratory Species

Short-Eared Owl, *Asio flammeus*, nests and winters in grasslands and wetlands. LaSalle County lies in both breeding and wintering ranges, and wintering has been documented at **Sunbury Railroad Prairie Nature Preserve**, a mile-long strip of habitat scarcely thirty feet wide, six miles south of the Grand Ridge WRA. Wind turbines may affect this endangered owl through noise, verticality, and flicker, all related to distance. Once turbines are built, this distance relationship will be subject to change as land owners alter land management practices. This is likely to be of concern mainly if attractive habitat for Owls and their prey is created within or near the turbine array following construction.

Upland Sandpiper, *Bartramia longicauda*, an endangered grassland bird, prefers habitats of short-grass prairie/pasture. Several recent (2005) breeding records for this species exist from grassed waterways in northwestern Livingston County, about seven miles south of the project. There appears to be much similar habitat within the Grand Ridge WRA, and this species undoubtedly appears as a migrant in LaSalle County. This species may be sensitive to the

proximity of vertical structures, or to shadow "flicker" on potential nesting areas. Wind turbines may displace or exclude this species from otherwise suitable habitat.

Loggerhead Shrike, *Lanius ludovicianus*, has not been reported as breeding in LaSalle County since 1987 but is broadly distributed across Illinois and could be present as a breeder or as a migrant. The Loggerhead Shrike needs thorny trees and shrubs, even barbed wire, on which to impale its prey, which may be left for several days before being eaten. Areas which support large insects and small rodents, major food items, are also necessary. Due to losses of suitable habitat, Loggerhead Shrikes may attempt reproduction in trees near human habitations and in other areas where they would normally not be expected to breed. The primary consideration for wind energy facilities is the potential for further loss of remaining habitat, if fence-rows--or even single trees-- are cleared to avoid wind turbulence or to improve turbine exposure, or if road-side trees are cleared during the breeding season to create turning-radii for turbine carriers or to establish power lines. "Resident" foraging birds are not thought to be at significant risk from operating wind turbines but verifying observations are needed.

Cerulean Warbler, *Dendroica cerulean*, has recent (2007) nesting records from **Sandy Ford Land & Water Reserve**, **Matthiessen State Park**, and **Starved Rock State Park**, the nearest of which is about four miles from the Grand Ridge WRA. Other large forest blocks in the area may support breeding pairs. Direct threats to this species from utility-scale wind turbines are likely limited to the potential for turbine-blade collisions with migrating individuals, unless the alteration or removal of large forest blocks occurs incidental to constructing the wind energy facility, as might be the case during road-widening or the installation of power lines, if done during the breeding season.

Northern Harrier, *Circus cyaneus*, is an endangered ground-nesting grassland hawk. It is a frequently-observed spring and fall migrant in LaSalle County, with numbers reported during pre-construction avian surveys associated with this and other nearby proposed wind energy facilities. The species has a statewide breeding range. Anecdotal evidence suggests this species will avoid hunting in the vicinity of large wind turbines.

Recommendation #7. The Department recommends mapping all habitat types within and near the project footprint, then checking areas of appropriate habitat for the presence of migratory listed species prior to any initiation of construction disturbance during the breeding season.

*Recommendation #8. If pre-construction surveys indicate use of the project area by migrant or resident **Northern Harriers**, post-construction surveys should be considered to determine whether Harriers avoid the vicinity of turbines.*

In addition to the consultation requirements of the IESPA and the INAPA, 20 ILCS 805/ 805-105 empowers the Department "to take all measures necessary for the conservation, preservation, distribution, introduction, propagation, and restoration of the fauna and flora, except where other laws designate responsibilities specifically to other governmental agencies." This authority is supplemented by similar powers granted under the *Fish and Aquatic Life Code*, 515 ILCS 5, and the *Wildlife Code*, 520 ILCS 5.

Because of the scope of potential impact, the Department provides wide-ranging information on potential wildlife issues with respect to wind energy facilities. This information, while distinct from the consultation pursuant to 17 Ill. Adm. Code Part 1075, is attached as a separate document, and should be considered by the Developer and the County.

Consultation on the part of the Department is terminated, unless the County desires additional information or advice related to this proposal. In accordance with 17 Ill. Adm. Code 1075.40(h), LaSalle County must notify the Department of its decision regarding these recommendations, whether it will:

- Allow the action to proceed as originally proposed;
- Require the action to be modified per Department recommendations (please specify which measures if not all will be required); or
- Forgo the action.

This consultation is valid for two years unless new information becomes available that was not previously considered; the proposed action is modified; or additional species, essential habitat, or Natural Areas are identified in the vicinity. If the project has not been implemented within two years of the date of this letter, or any of the above listed conditions develop, a new consultation is necessary.

The natural resource review reflects the information existing in the Illinois Natural Heritage Database at the time of the project submittal, and should not be regarded as a final statement on the site being considered, nor should it be a substitute for detailed site surveys or field surveys required for environmental assessments. If additional protected resources are encountered during the project's implementation, the applicant must comply with the applicable statutes and regulations. Also, note that termination does not imply IDNR's authorization or endorsement of the proposed action.

Please contact me if you have questions regarding this review.

Sincerely,

Keith M. Shank
Impact Assessment Section
Division of Ecosystems and Environment
keith.shank@illinois.gov
(217) 785-5500

cc: Jenny Skufca, Illinois Nature Preserves Commission
John Martin, Invenergy LLC

ATTACHMENT

Invenergy LLC
Grand Ridge Wind Farm Phase V
LaSalle County

Pursuant to the Department's authority to conserve and to protect the fauna and flora of Illinois, the following information is provided about possible impacts to several state-listed and non-listed species that could be found in the area. In certain instances it also provides recommendations for the consideration of the County and the developer.

The construction of large-scale wind farms has implications for a broad range of wildlife; it may result in increased mortality, fragmentation of essential habitats, and displacement of important life-cycle activities, such as feeding and nesting. To assess the effects of such facilities, it is imperative to establish a base-line of wildlife presence and activity within and near the proposed facility to which later conditions may be compared in order to discern how they may have been affected by the wind farm or other human modifications of the area.

- *Recommendation #1. Invenergy should continue to perform pre- and post-construction assessments of avian and bat usage within the project area. Consideration of all seasons should be included, although spring migration is anticipated to be of greatest interest for birds. Acoustic bat activity monitoring is also appropriate, particularly during the fall migratory season when activity would be expected to be highest. Acoustic recordings should be analyzed to identify the bat species present.*

- The **Bald Eagle**, *Haliaeetus leucocephalus*, remains protected by two federal laws, the *Migratory Bird Treaty Act* and the *Bald and Golden Eagle Protection Act*. Large numbers of Eagles congregate in the vicinities of the locks and dams on the Illinois River during the winter, and in recent years significant numbers have begun nesting and breeding along the Illinois River and its tributaries. Portions of the WRA lie within two miles of the Illinois River and within three miles of Plum Island. Bald Eagles are also known to fly overland during migration, and have been observed flying over Otter Creek west of Ransom.

  The Department is unaware of any case of a Bald Eagle colliding with a wind turbine. How Bald Eagles along the Illinois River corridor may be affected by the sight of several hundred large wind turbines operating south of the River is unknown.

  Recommendation #2. Invenergy should study Bald Eagle use of the Illinois River corridor in this vicinity prior to construction, and identify changed use patterns following construction; seeking the advice of the U. S. Fish & Wildlife Service is also appropriate.

- **American Golden Plover,** *Pluvialis dominica*, breeds in the arctic tundra, migrates south along the Atlantic seaboard in the fall, and returns northward through eastern Illinois and Western Indiana in the spring. Illinois and Indiana provide important staging areas for

the Golden Plover, where it may remain for as long as two months and go through a molt before continuing its migration. Its presence in Illinois typically extends between mid-March and mid-May with a peak in late April.

These birds prefer pasture, grasslands, or soybean stubble, often with temporary shallow wetlands. Despite earlier concerns about potential collision mortality, recent reports indicate this species could be displaced or excluded from habitat occupied by wind turbines, being rarely observed within 400 meters (> one-quarter mile) of 1.5-MW machines. Given typical turbine spacing, this species may be displaced and excluded from nearly all the habitat within the interior of a wind energy development. This, in turn, may have grave implications to the species where wind energy developments are crowded together over broad areas, as is the case in southeastern LaSalle County.

In past decades, this species has appeared near LaSalle Lake in flocks numbering in the thousands. Recent observations have identified only a few flocks of less than a hundred birds in the vicinity of Ransom. However, the locations of staging areas for large concentrations of this species have varied considerably over the last ten years, and it would be premature to conclude the WRA is not located in an important staging area.

*Recommendation #3. Invenergy should study whether **American Golden Plovers** stage in the vicinity and, if so, relate their use of habitats to the nearest wind turbines to determine whether the species is displaced and excluded by their presence.*

- An experimental population of the federally-listed endangered **Whooping Crane**, *Grus americana*, has been established with migration terminals in Wisconsin and Florida. Now numbering more than 100 birds, the flock passes through Illinois during both its spring and fall migrations. The 2007 Annual Report of the USFWS Whooping Crane Recovery Team identified wind turbine energy facilities as threats to these animals.

  During migrations birds may spend several days at one or more locations in Illinois, foraging in the surrounding countryside. As these birds descend, rest or forage, and ascend again, they are vulnerable to collisions with power lines and wind turbines. Most non-predation casualties in the Eastern Experimental Flock have entailed collisions with power lines.

  "Operation Migration" is an experimental means of teaching captive-reared Crane chicks the preferred fall migration route. This entails the use of ultra-light aircraft whose pilots are clad in Crane costumes. The organization maintains a daily Internet diary of events along the way which is avidly followed by millions of people.

  Currently, the preferred route includes a stop-over in northern LaSalle County, with the next staging area located in western Livingston County. Operation Migration flights have cruising altitudes between 1,500 and 2,500 feet. This route pattern will bring the new Crane chicks within close proximity to the Grand Ridge WRA.

  Energy facility staff should be aware of the potential conflict with this species, be able to identify it, and should respond to its presence appropriately.

Several endangered or threatened species could occur in the vicinity or migrate through the area. These are discussed below.

- The **Ornate Box Turtle**, *Terrapene ornate*, is usually found in open grassland areas with sandy soils, but is not restricted to them and could be present in agricultural fields and other portions of the project area. It hibernates underground from late September through April, so cannot evade disturbance during that period. Wind turbines may adversely affect this species and its essential habitat in a number of ways, including, but not limited to, construction traffic, excavations, flicker, vibration, and habitat fragmentation.

  *<u>Recommendation #4</u>. Project workers should be educated as to the appearance and habits of the **Ornate Box Turtle**, remain alert for turtles on roads and in fields, and report any suspected Ornate Box Turtles to supervisors. The Department of Natural Resources should be promptly notified of any Ornate Box Turtles identified.*

- **Franklin's Ground Squirrel,** *Spermophilus franklinii*, is most active above-ground on sunny days in late spring and early summer. This species hibernates for seven to nine months of the year. It prefers taller vegetation than other ground squirrels, and so is seldom seen. Well-drained ground is a requisite, so today this species is most often found along railroads and highways where its requirements for food and shelter are satisfied. The Franklin's Ground Squirrel has been documented at **Sunbury Railroad Prairie Nature Preserve** in Livingston County, six miles from the project area. Offspring can disperse up to a mile in their first season. If present, this species can be threatened during construction through the crushing and collapse of its burrows by heavy equipment. Shadow flicker, noise, and vibration related to operating turbines may be detrimental.

- **Eryngium Stem-Borer Moth,** *Papaipema eryngii*, is dependent on a specific host-plant, the Rattlesnake Master, *Eryngium yuccifolium*, typically found in mesic-to-dry prairies. A large population of this plant is present within the **Voight Pauper Cemetery Prairie LWR**. However, past management of the LWR has likely eliminated any population of the Stem-Borer which may have formerly existed there. The nearest documented population of the Stem-Borer is located 12 miles east of the county line within the I-55 corridor in Grundy County, a distance which makes natural dispersion and colonization unlikely unless intervening habitat exists. However, current or former rail corridors intersect both the Interstate and the WRA, providing areas in which populations of Rattlesnake Master (and the Moth) may occur, so that colonization or establishment cannot be ruled out. The operation of wind turbines is not known to pose a threat to the Eryngium Stem-Borer. However, construction activities may have the potential to take the larval stage of the species if concentrations (several hundred plants) of Rattlesnake Master are disturbed. Avoidance of harm to populations of the host plant is the best means of avoiding harm to the Stem-borer.

- The **Mudpuppy**, *Necturus maculosus*, is the only known glochidial host of the State-listed endangered Salamander Mussel, *Simpsonaias ambigua,* a species which is now being evaluated for federal listing under the *Endangered Species Act*. The decline of the

Mudpuppy may be a major factor in the disappearance of the Salamander Mussel. Its former range was State-wide.

The Mudpuppy inhabits clear rivers, creeks, streams, lakes, and ponds, but conceals itself under rocks or woody debris during the day, feeding actively at night. Clear gravelly headwater areas are necessary for reproduction; mating occurs from late fall through winter, with egg-laying in the spring. It preys on a large variety of macro-invertebrates and small vertebrates, including fish and amphibians. A lateral line containing pressure, motion, and electroreceptor sensor cells is a primary means of detecting prey and avoiding predators. Migratory movements within streams and lakes are common.

Cool or cold water is essential for this species, which remains active all winter; water temperatures above 72°F are harmful, and those above 77°F can be fatal. Agricultural tile drainage helps lower stream temperatures, but the removal of riparian trees and shrubs exposes streams to direct solar radiation and heating. In-stream cover provided by rocks and woody debris is essential for concealment and reproduction, since eggs are suspended from the bottoms of rocks and logs.

The main risks associated with wind energy projects are direct stream modification through the repair or upgrade of roads, modification of thermal regimes through the disruption of agricultural tile drainage systems, the introduction of electro-magnetic fields where previously absent, barriers to in-stream migration, and siltation and sedimentation associated with construction and new permanent features, such as service roads. Measures designed to minimize or avoid adverse modification of the Otter Creek INAI Site will also protect any potentially present Mudpuppy population.

- The **Smooth Softshell**, *Apalone mutica*, inhabits larger streams and rivers, in segments with sandy substrates and sand bars. This species may be present in LaSalle County, since its range was formerly State-wide. It is often confused with its close relative, the Spiny Softshell Turtle, *Apalone spinifera*, which is more often found in ponds and sloughs. Unless transportation of wind turbine components requires the upgrade or reconstruction of bridges outside the project area, there should be little risk of direct adverse effects to this species, since streams within the project area are likely too small to serve as primary habitat for this turtle. Erosion and siltation pose indirect threats through downstream degradation.

- The **Black-Billed Cuckoo,** *Coccyzus erythropthalmus*, nests in interior thickets of forested tracts and feeds heavily on caterpillars. Although IDNR does not possess a record for this species in LaSalle County, the county lies within its migratory and breeding range and the extensive riparian forests of LaSalle County could provide abundant habitat. This species is not directly threatened by wind turbine construction or operation, absent direct impact to breeding areas, but may be subject to collision risk as a migrant.

Numerous INAI Sites, Nature Preserves, Land & Water Reserves, and State Parks are in the vicinity of the Grand Ridge WRA. Each is briefly discussed below.

- **Marseilles State Fish & Wildlife Area** lies directly adjacent to the north side of the WRA; a turbine built during Phase I is located within 1,000 feet of the property line and habitat used by the recently de-listed Henslow's Sparrow. This property is primarily used for hunting and military training, activities which are in no way impaired by turbine visibility. No adverse effects on the avian use of grassland habitats nearest the turbines have been reported, but neither have they been studied.

- The **Marseilles Hill Prairie INAI Site** is located on the bluff tops on the opposite side from the wind farm, and will not be adversely modified or affected. However, the SFWA provides essential habitat for migratory bats and birds whose migratory passages and foraging activities could pose issues for the Grand Ridge WRA.

- **Illini State Park**, which in 2007 received nearly 730,000 visitors, lies on the south bank of the Illinois River, only a mile north of the Grand Ridge WRA, with portions of the Park extending within three-quarters of a mile. The major campgrounds in the Park lie at an elevation just below 500 feet MSL, about 1.5 miles from the nearest portion of the WRA. This will place turbine blade tips about 600 feet higher than an observer in the campground. At this distance, however, the viewing angle for the blade tip will be just slightly more than four degrees, which means the line-of-sight will fall below the tops of the trees in the Park.

  This Park provides essential habitat for migratory bats and birds, including a heron rookery and the **Bald Eagle**, whose migratory passages could pose issues for the project.

- The **Illinois River–Marseilles INAI Site** runs alongside the Park, and provides essential habitat to the State-listed **River Redhorse**, *Moxostoma carinatum*. So long as construction disturbances in the WRA do not contribute to degraded water quality in the small streams running down to the River (and through the Park), the INAI Site should remain unaffected.

- **Buffalo Rock State Park**, a former strip mine which in 2007 received 143,000 visitors, occupies the north bank of the Illinois River about five miles north-northwest of the nearest proposed development area in the Grand Ridge WRA. Grand Ridge turbines are likely to be visible from the Park, since their base elevations will be about one hundred feet higher than the highest points in the Park and the south bank bluffs will not obscure the view. The major attractions in this Park are the manmade Effigy Tumuli earth sculptures, and the visibility of turbines across the Illinois River is unlikely to be detrimental to their enjoyment. Whether turbine visibility is considered to enhance or detract from the views otherwise available from the Park is likely to be a matter of individual opinion.

  This Park also provides essential habitat for migratory bats and birds, including the **Bald Eagle**, whose migratory passages could pose issues for the project.

- **Starved Rock State Park**, which in 2007 received over two million visitors, lies only five miles northwest of the Grand Ridge WRA, but the **Starved Rock Nature Preserve** is located in the western portion of the Park, more than nine miles from the nearest proposed wind energy development area, where its values will not be adversely modified or affected.

  Wind turbines in the nearest development area may be visible from some upland portions of the Park. One of the upland campgrounds will be at a distance of about eight miles. Although there are some low intervening ridges, turbines nearly 400 feet high will still likely be visible from this camping area, especially at night when aviation warning lights are operating. However, the premier venues in the Park are unlikely to be affected by turbine visibility.

  The presence of the Park is significant to the project because it provides essential habitat for bats and birds whose migratory passages could pose issues for the project. Starved Rock is famous for its large winter assemblages of Bald Eagles, especially at the **Plum Island Natural Heritage Landmark** in the Illinois River.

- **Matthiessen State Park**, which in 2007 received over 260,000 visitors, is located along the Vermilion River less than nine miles west of the Grand Ridge WRA. It is possible the Grand Ridge turbines will be visible from some open elevations within the Park, since the intervening ridge is only about 50 feet high and is unwooded. However, it is unlikely any turbines will be visible from the highly-valued scenic portions of the Park, including **Matthiessen Dells Nature Preserve**.

  However, the presence of the Park remains significant to the project because it provides essential habitat for migratory bats and birds, including documented records for the endangered **Cerulean Warbler** and the **Bald Eagle**, whose migratory passages could pose issues for the project.

- **Sandy Ford Land and Water Reserve** is located less than four miles west of the project area. It is possible several turbines within the project area may be visible from the upland grasslands of the Reserve, adjacent the public road, but they should not be obtrusive, and once observers enter the tree-line the project will not be visible. Sandy Ford provides essential habitat for migratory bats and birds, including the endangered **Cerulean Warbler**, whose migratory passages could pose issues for the project.

- **Sunbury Railroad Prairie Nature Preserve** is a 15-acre, one-mile-long, thirty-foot-wide, abandoned rail corridor, owned by the IDNR, about 5.5 miles south of the Grand Ridge WRA. However, Sunbury Prairie Nature Preserve lies within the footprint of other wind energy facilities being planned for Livingston County, and beyond the Top Crop WRA, so any visual impact of this project will be negligible.

  The Preserve provides documented essential habitat for migratory birds, including wintering raptors such as the endangered **Short-Eared Owl**, *Asio flammeus*, and for the threatened **Franklin's Ground Squirrel,** *Spermophilus franklinii*.

- **Voight Pauper Cemetery Prairie Land and Water Reserve** is a one-acre mesic prairie that will be visually dominated by the Iberdrola/Heartland Otter Creek WRA. Due to an intervening ridge, Grand Ridge turbines four miles to the north are unlikely to be visible from the Reserve and no other effects of the Grand Ridge WRA are anticipated. No faunal surveys of this Reserve have been performed, but this site has the potential to support populations of the endangered **Eryngium Stem-Borer Moth**, *Papaipema eryngii*; the threatened **Red-Veined Prairie Leafhopper**, *Aflexia rubranura*; and the threatened **Franklin's Ground Squirrel**.